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repetition. But the fault seems to be due also to a fear that the reader will have forgotten or overlooked or misunderstood the significance of something the author considers of great importance. This desire to be perfectly understood leads to an exceptionally large number of references to plates and figures and to other passages in the text, so that the reading tends to become slow and laborious, or if the references be ignored, it tends to be superficial. In the explanation of the plates, the author's care for details is shown to a marked degree. It is safe to say one rarely sees a volume in which the explanatory text for the plates is so complete. So far as the statements or interpretations of facts are concerned, the author's freedom from obvious error and from ill-judged conclusions is really remarkable. In all his references to other workers, Jackson shows not only an open-mindedness and fairness of judgment, but a courtesy even in disagreement that is delightful. At the same time, there is no glossing over of mistakes in earlier publications, no matter whether made by himself or some other authority. The perfectly evident desire to know the facts as they really are wins the reader's confidence and the unusual freedom from ambiguity prevents any misunderstandings.

The typographical work reflects the greatest credit on the Cosmos Press, especially when one considers the numerous tables with percentages often worked out to two decimals and the abundance of scientific names and technical terms. That slips of the pen and occasional transposed letters should occur is inevitable; the extraordinary thing is how very few there are in this volume. Nearly all have been detected and gathered together on the page of "Errata and Addenda" which follows the index, but they are mostly so trivial as to be of absolutely no importance. On page 188, however, the phrase "distinct continuous base" carries no meaning and we are therefore glad to have the Errata explain that it should read "discontinuous base." On page 251, we are told by the Errata, the words "starfish" and "sea-urchin" have been trans-

posed in the author's discussion of *Paleodiscus*, an error which if uncorrected would seriously affect the argument. Two slips not noted in the "Errata," although not of great importance, may perhaps be worth pointing out. On page 121, in the footnote it is said that *Toxopneustes atlanticus* was described by Mr. Agassiz as *Leptechinus atlanticus*; the generic name should read *Lytechinus*. On page 238, the order Bothriocidaroida is inadvertently attributed to Jackson, 1896, whereas Duncan introduced the term in 1889.

When Alexander Agassiz's "Revision of the Echini" was published in 1872-74, it marked an epoch in the study of sea-urchins. It has literally been the foundation of all subsequent work throughout the world. It brought together and summarized the knowledge of echini as it stood at that time and much of the work it involved need never be done again. Jackson's "Phylogeny of the Echini" is a similar summing up of our knowledge to-day from the twentieth-century point of view and, like the "Revision," it marks an epoch. We are all to be congratulated that this fitting companion volume to the "Revision" is the work of an American zoologist; the Boston Society of Natural History is to be congratulated on the publication of a memoir of such unusual merit; and Dr. Jackson himself is most of all to be felicitated on the production of such a profound and masterly piece of research.

HUBERT LYMAN CLARK

The Parasitic Amœbæ of Man. By CHARLES F. CRAIG, M.D., Captain, Medical Corps, U. S. Army. 1911. J. B. Lippincott Company. Pp. 253. \$2.50.

This book has no doubt been welcomed by many medical men, for it brings together the scattered literature in a complex field. In making such a compilation it is natural, perhaps, that the author should be biased by his own investigations. However, it is unfortunate that this fixed attitude should be so much in evidence throughout a work the purpose of which is to aid medical men in their studies of amœbic infections. A more critical

and less positive method of presentation would have increased the value of the work.

On the whole, the descriptive portions of the work, covering the morphology, biology, classification, nomenclature and species of parasitic amœbæ, are excellently executed and well illustrated.

A firm belief in the stability of the parasitic species *Entamœba histolytica*, *E. coli* and *E. tetragena* and the ease with which they may be differentiated on morphological grounds, provided one has studied them long enough, is made evident by the author. In the historical review it is said that Councilman and Lafleur gave "a most excellent description of the parasite now known as *Entamœba histolytica*." This is done in spite of the admission that comparatively recent researches have shown that species determination must rest mainly upon a knowledge of the reproductive cycle. Again, the author is not very consistent in including in his list of unquestionable species half a dozen organisms the life cycles of which have been only incompletely studied.

No adequate discussion is made of the possible adaptability of amœbæ to a parasitic existence, although on *a priori* grounds one would suspect that some such process might still be taking place in nature. The answer to this question is evidently of the greatest importance from the standpoint of the prophylaxis of amœbiasis. The only extensive experiments made to adapt amœbæ to a parasitic existence have been performed by Musgrave and Clegg in Manila. In criticizing the experiments performed by these investigators the author is rather indefinite and dismisses the importance of their work from the reader's mind by stating that "while lesions were undoubtedly produced by the mixed cultures of amœbæ and bacteria, the authors could not, with their methods, be sure of excluding the spores of *E. histolytica* or the encysted forms of other amœbæ pathogenic to the animals used in their experiments" (p. 63). Later (p. 66) he lays stress upon the feeding of "pathogenic bacteria" along with the cultivated amœbæ—in spite of the fact that it is well known that the typhoid bacillus and

cholera spirillum are not pathogenic when fed to the species of monkey used (*Macacus cynomolgus*). Certainly one can not criticize the cultures of amœbæ used by Musgrave and Clegg, for these were the descendants of a single amœba growing in "pure mixed culture" with a single species of bacterium. If it is argued that their animals were infected naturally either before or after the experimental feedings, then it must be shown that spontaneous amœbiasis is of such frequent occurrence in monkeys in Manila as to render these animals worthless for experimental purposes.

Again this state of mind is exhibited in discussing the cultivability of the parasitic amœbæ: "What I have always believed and stated, *i. e.*, that the parasitic amœbæ of man have not been cultivated" as Craig says, he believes to be supported by the recent work of Whitmore, who took cultures he obtained in Manila to Hartmann's laboratory and found them all to be free living species. Yet he makes no mention of the work of Fantam, whose article is quoted in his bibliography, to the effect that, by special cultural methods, he was able to identify two cultures obtained from Manila and kept on Musgrave and Clegg's medium, as *Entamœba coli*.

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BOTANICAL NOTES

BOTANY BY THE EXPERIMENTAL METHOD

A GOOD many years ago some of us introduced to American colleges the laboratory method of learning about plants and this brought about a revolution in botanical teaching mostly for the better, but not wholly without some distinct losses. It is doubtful, for example, whether the pioneers in the laboratory method in this country ever contemplated the total abandonment of field work which followed in some places. 'It is pretty certain that they intended to *add* the laboratory method to the existing methods of study, which included the textbook, the field and the herbarium. Certain it is, however, that many teachers supposed that the adoption of the laboratory